

PRE- AND POST-CALVING PROTEIN OR ENERGY SUPPLEMENTATION OF SPRING-CALVING BEEF COWS

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Story in Brief

Ninety-six spring calving Hereford and Hereford x Angus cows (1065 lb) grazing native range were used. An energy supplement with 20% CP (79% soybean hulls, 15% soybean meal plus minerals) or a protein supplement with 40% CP (90% soybean meal) were individually fed to provide 1.2 lbs of CP/day from November 8 to calving. At calving, half the cows from each supplement type were switched to the other supplement, resulting in four post-calving treatments. Pre-calving, cows fed energy supplement gained more weight and lost less body condition than cows fed protein. However, weight and condition losses were similar from calving to April 19 for all treatments, as were calf weight gains. Pregnancy rates were similar (approximately 95%) for all treatments. The increased cow weight observed pre-calving but no change in cow weight or condition post-calving is in agreement with total energy intakes predicted from an intake/digestion study conducted simultaneously with this performance study. In conclusion, it appears that benefits of additional levels of energy supplements on cow weight and condition must be achieved before calving.

(Key Words: Cows, Supplementation, Soybean Hulls, Soybean Meal, Energy, Protein.)

Introduction

Feeding supplemental protein to cows grazing forages that are deficient in protein increases forage intake (Ovenell, et al., 1991; Fleck, et al., 1988). However, some classes of cattle such as first-calf heifers may need additional energy over that consumed when economically feasible amounts of high protein supplements are fed. When the supplemental crude protein level is adequate, feeding additional amounts of lower protein supplements can improve weight and condition before calving but apparently have little effect on post-calving weight and condition changes (Lusby et al., 1991; Marston et al., 1992). Because of the importance of body condition on reproduction in

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beef cows, it is critical to know what type of supplements to feed and when best to feed them to maximize utilization of forages for beef production. The objectives of this study were to compare the effects of protein or energy supplements fed pre- or post-calving on performance of spring-calving cows.

Material and Methods

On November 8, 1990 ninety-six spring-calving Hereford and Hereford x Angus cows were allotted to one of four treatments by blocking on breed, age, weight, and body condition score. Cows were supplemented until calving with a soybean hull based supplement (hulls) or a soybean meal (meal) based supplement fed to provide about 1.2 lb of crude protein daily. After calving, half of the cows from each pre-calving group were switched to the other supplement resulting in four post-calving supplement treatments. Supplement compositions, amounts fed, and protein percentages are presented in Table 1. Supplement amounts were prorated for a 6-day/wk feeding schedule. All cows grazed together in a common pasture with native tallgrasses predominating and were individually fed their supplements in covered stalls. Because of an unplanned range fire on March 22, 1991, grass hay was provided ad libitum until the end of supplementation on April 19.

Body condition scores were assigned on February 2, 1991 (beginning of calving season) and April 19, 1991 (beginning of breeding season). Cow weights were taken after overnight withdrawal from feed and water at approximately 28-day intervals until February 2, 1991. Once the calving season started, cows were weighed at 14-day intervals with the closest weight prior to calving considered to be the final pre-calving weight, and the closest weight after calving as the first post-calving weight. All calves were weighed and bull calves were castrated by banding within 2 days of birth.

One cow was eliminated from the analysis because of failure to calve within the 60-day calving season. Therefore 95 cows were used in the analysis for weight and body condition score prior to and including calving. Fifteen other cows were eliminated from the analysis of measurements taken after calving because of calf mortality, mastitis, or calving after April 1, 1991. Pre-calving data was analyzed with least square analysis of variance procedures. The model included treatment, breed, age of dam as variables and initial cow weight, initial body condition score, and calf birthdate as covariates. Two and three way interactions were tested and eliminated when nonsignificant ($P > .10$). Post-calving data were analyzed as a 2 x 2 factorial with two pre-calving and two post-calving treatments.

Table 1. Composition of supplements and daily feeding rates (as fed basis).

Supplement	Soybean hull (SBH)	Soybean meal (SBM)
Ingredients, %		
Soybean meal	15.51	90.34
Soybean hulls	79.14	3.23
Molasses	4.83	4.76
Dicalcium phosphate	.47	1.66
Vitamin A, 30,000 IU/gm	.05	.05
Copper sulfate		.01
Crude protein % ^a	19.83	42.96
Feeding rate, lb/day		
Daily basis	6.7	3.0
Prorated 6 days/week	7.8	3.5
Daily crude protein supplied, lb	1.23	1.19

^a Expressed on dry matter basis.

Results and Discussion

Cows fed the 20% protein supplement gained 39 lb more ($P < .01$) from the beginning of the trial until calving than those cows fed the 40% protein supplement (Table 2). Pre-calving body condition scores reflected pre-calving weight changes ($P < .01$).

Feeding additional energy post-calving did not influence post-calving cow weight or body condition changes. This was true whether cows had been fed protein or energy supplements pre-calving. As a result, the total winter weight and condition changes reflected pre-calving changes. Cow weight and condition changes observed during the breeding season and from mid-July until weaning in late-September were similar (Table 3).

Type of pre-calving supplement did not affect birthweight. These data indicate that sufficient nutrients were made available for prenatal calf development and any additional nutrients obtained were used to increase cow body weight. Calf gains from birth to the end of the supplementation period

Table 2. The effect of soybean hull (SBH) and soybean meal (SBM) based supplementation fed prior to calving on body weight, weight gain, body condition score, and calf birth weight.

	Treatment	
	SBH	SBM
No. of cows	47	48
Cow weight, lb		
Initial, 11/08/90	1066	1061
Calving weight	1154	1109
Weight gains, intermediate, lb		
11/08/90-12/11/90, 33 days	43 ^a	31 ^b
12/11/90-1/03/91, 23 days	7 ^a	-8 ^b
1/03/91-2/08/91, 36 days	10 ^a	-6 ^b
Weight gains, total, lb		
11/08/90-calving	80 ^a	41 ^b
Body condition score		
11/08/90	6.1	6.1
2/08/91	5.4 ^a	5.1 ^b
Calf birth weight, lb	84	83

^{ab} Means in the same row with different superscripts differ ($P < .01$).

on April 19 were not different between the supplementation regimens. Because early calf weight gains are highly correlated to milk production (Pope et al., 1963), these data indicate that supplements did not affect milk production.

Pregnancy rates were similar (approximately 95%) for all treatments. The combination of an unusually mild winter and a majority of the cows being mature resulted in the protein supplements being adequate to meet requirements for reproduction.

In a companion study involving these cows and the same levels of supplementation, Marston et al. (1992) found a greater substitution of

Table 3. The effect of different combinations of soybean hull (SBH) and soybean meal (SBM) based supplements on body weight and condition score, weight gains, and calf performance.

Combinations ^a	Treatment			
	1 SBH/SBH	2 SBH/SBM	3 SBM/SBH	4 SBM/SBM
No. of cows	18	21	21	22
Calving weight, lb	1145 ^b	1148 ^b	1114 ^c	1101 ^c
Weight changes, lb				
Calving to 4/19/91	-182	-184	-174	-173
4/19/91 to 7/19/91	145	153	158	154
7/19/91 to 9/27/91	-33	-31	-36	-23
Total winter weight change, lb				
11/08/90 to 4/19/91	-103 ^b	-101 ^b	-123 ^{bc}	-137 ^c
Pre-calving body condition score	6.3	6.2	6.2	6.2
Body condition score changes				
Calving to 4/19/91	0	0	0	0
4/19/91 to 7/19/91	.2	.3	.3	.3
7/19/91 to 9/27/91	0	0	0	.2
Total winter condition change				
11/08/90 to 4/19/91	-.8 ^b	-.7 ^b	-.9 ^{bc}	-1.1 ^c
Calf performance,				
Weight gain				
birth to 4/19/91, lb	56	69	55	64
Wean weight ^t , lb	461	442	447	452

^a Combination reported as prior to calving/after calving.

^{bc} Means in the same row with different superscripts differ ($P < .05$).

supplement intake for forage intake when cows were lactating compared to non-lactating cows. The substitution of supplement for forage during lactation was sufficient to predict no total increase in energy intake (forage plus supplement) from feeding the increased amount of energy used in this study. The increased cow weight observed pre-calving but no change in cow weight or condition post-calving is in agreement with total energy intakes predicted from the intake study.

If producers need to use energy supplements to increase body weight and/or body condition score of spring-calving beef cows grazing dormant forage, it appears that these changes must occur prior to calving.

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